CLAIMS

1. An optical component attachment apparatus adapted to attach a plurality of optical components to a plurality of mating optical fibers being processed within a multi-stage integrated optical component processing system, comprising an insertion robot adapted to position the plurality of the optical components and the plurality of mating optical fibers within a component insertion tool, wherein the component insertion tool is configured to insert a plurality of mating optical components to a plurality of mating fiber optic cables held in a processing position relative the longitudinal axis of the mating optical components.

2. The apparatus of claim 1, wherein the component attachment tool further comprises a fiber gripper assembly having a plurality of insertion pinchers thereon, each of the plurality of insertion pinchers being adapted to grip and support one of the plurality of mating optical fibers in an attachment position.

3. The apparatus of claim 2, wherein the insertion robot further comprises an assembly gripper adapted to grip and move at least one of the plurality of mating optical fibers into a processing position within each of the plurality of insertion pinchers.

4. The apparatus of claim 1, wherein the component attachment tool further comprises a first set of component holding recesses, wherein each of the first set of component recesses are adapted to hold one or more of the plurality of components therein.

5. The apparatus of claim 4, wherein the first component insertion assembly is rotatably mounted to a moveable attachment assembly adapted to move the first component insertion assembly between a component loading position and a processing position.

6. The apparatus of claim 4, wherein the first set of component holding recesses are adapted to rotate between a component loading position and a processing position.

7. The apparatus of claim 6, wherein each recess of the first set of component holding recesses are adapted to axially rotate at least one or more components held therein.

8. The apparatus of claim 6, wherein the first component insertion assembly comprises a second set of component holding recesses, wherein when the first set of component holding recesses is rotated to an attachment position the second set of component holding recesses is rotated to a component loading position.

9. The apparatus of claim 8, wherein the second set of component holding recesses are adapted to axially rotate one of the plurality of components held therein.

10. The apparatus of claim 1, further comprising an epoxy curing apparatus adapted to cure epoxy used to bond one or more of the plurality of optical components to the plurality of mating optical fibers.

11. The apparatus of claim 10, wherein the epoxy curing apparatus comprises a heater configured to heat and cure the epoxy.

12. An optical component attachment apparatus adapted to attach at least one of a plurality of optical components to a fiber optic cable cladding and core, comprising:

a component attachment assembly adapted to attach at least one of the plurality of optical components to the fiber optic cable cladding and core, wherein the component attachment assembly includes a fiber gripper assembly adapted to grip the fiber optic cable cladding and core; and

an insertion assembly adapted to insert the at least one of a plurality of optical components to a receiving end of the fiber optic cable cladding and core.

13. The apparatus of claim 12, wherein the component attachment assembly comprises a component attachment tool rotatably mounted to a moveable

attachment assembly that is adapted to move the component attachment assembly between a component loading and a component attachment position.

14. The apparatus of claim 12, wherein the component attachment tool comprises a first set of component holding recesses, wherein each recess is adapted to hold one of the plurality of optical components therein.

15. The apparatus of claim 14, wherein each of the first set of component holding recesses are adapted to axially rotate the one of the plurality of components held therein.

16. The apparatus of claim 14, wherein the component attachment tool further comprises a second set of holding recesses wherein when the first set of holding recesses is rotated to a attachment position the second set of holding recesses is rotated to a component loading position.

17. The apparatus of claim 16, wherein each recess of the second set of component holding recesses are adapted to axially rotate the one of the plurality of components held therein.

18. A method for attaching a plurality of optical components to a cladding and core of a plurality of mating fiber optic cables, comprising:

aligning the plurality of optical components in a component attachment position with respect to a longitudinal axis of a mating fiber optic cable;

axially rotating at least one of the plurality of optical components; and

inserting at least one of the plurality of optical components on the cladding and core of the mating fiber optic cable while the at least one of the plurality of optical components are being axially rotated.

19. The method of claim 18, wherein aligning comprises rotating the plurality of optical components between a component loading position and the component attachment position.

20. The method of claim 18, wherein prior to aligning, loading the plurality of optical components in a component attachment tool and then rotating the plurality of optical components to about the component attachment position.

21. The method of claim 18, wherein axially rotating comprises inserting at least one of the plurality of optical components in a component rotation assembly, wherein the component rotation assembly is adapted to individually rotate one or more of the at least one of the plurality of optical components about their longitudinal axis.

22. The method of claim 18, wherein inserting the at least one of the plurality of optical components onto the cladding and core of the mating fiber optic cable comprises positioning the cladding and core into an insertion position with respect to a longitudinal axis of at least one of the plurality of optical components and inserting the at least one of the plurality of optical components on a receiving end of the cladding and core.

23. The method of claim 18, further comprising bonding at least one cladding and core of the plurality of mating fiber optic cables to the at least one of the plurality of optical components.

24. The method of claim 23, wherein bonding comprises heating the cladding and core.

25. An optical component attachment apparatus adapted to attach one or more mating optical components to a plurality of mating optical fibers to form a plurality of separate optical interconnects, comprising:

a fiber gripper assembly having a plurality of attachment pinchers thereon aligned about parallel and along a horizontal plane to hold one of the plurality of mating optical fibers and one of the separate optical interconnects;

a component attachment tool having a plurality of component holding recesses thereon aligned about parallel and along the horizontal plane, wherein when positioned in axial alignment with the mating optical fibers, the component

attachment tool is adapted to hold, position, and insert the mating optical components on the mating fiber optic cables to form the separate optical interconnects;

a movable attachment assembly slidably coupled to a frame member and adapted to position the component attachment tool between a plurality of component loading positions and a plurality of component attachment positions adjacent the attachment pinchers; and

an attachment robot rotatably mounted to a robot platform wherein the attachment robot includes an attachment gripper thereon adapted to position the one or more fiber optic cables within the attachment pinchers and the mating optical components within the plurality of component holding recesses.

26. The apparatus of claim 25, wherein the component attachment tool is rotated by a rotation motor to position the plurality of component holding recesses in a component loading position to load the mating optical components therein.

27. The apparatus of claim 25, wherein the movable attachment assembly comprises an attachment motor to position the movable attachment assembly between the plurality of component loading positions and component attachment positions.

28. The apparatus of claim 25, wherein the component attachment tool includes a component rotation assembly adapted to individually rotate the components about their longitudinal axis to allow the optical fibers to be more easily inserted.

29. The apparatus of claim 25, wherein the component attachment tool further comprises a second set of component holding recesses wherein when the first set of component holding recesses is rotated to a attachment position the second set of component holding recesses is rotated to a component loading position.

30. The apparatus of claim 25, further comprising an epoxy curing apparatus having individual component heating recesses adapted to cure epoxy used to bond

one or more of the plurality of mating optical components to the plurality of mating optical fibers.

31. The apparatus of claim 30, wherein the epoxy curing apparatus is heated to cure the epoxy.